Wisconsin Department of Natural Resources
2006 Plan to Integrate Land Information

I. EXECUTIVE SUMMARY

This plan is submitted by the Wisconsin Department of Natural Resources (DNR). Preparation of this plan was coordinated by:

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Unless otherwise indicated, the mailing and street address of DNR staff cited in this plan is the same as that indicated above for the DNR Central Office in Madison, WI. The following staff are designated as contact persons for questions regarding DNR Land Information-related activities:

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- Lisa Helmuth, Water Resources Mgmt. Specialist, Lisa.Helmuth@dnr.state.wi.us, 608.266.7768
- Dawn Hinebaugh, Bureau of Endangered Resources (State Natural Areas), Dawn.Hinebaugh@dnr.state.wi.us, 608.266.5243
- Sally Kefer, DNR Land Use Team Leader, Sally.Kefer@dnr.state.wi.us, 608.266.0833
- Calvin Lawrence, FH/4, Calvin.Lawrence@dnr.state.wi.us, 608.266.0756
- Janel Pike, GIS Coordinator, Division of Forestry, Janel.Pike@dnr.state.wi.us, 608.266.2050
- Jill Rosenberg, Bureau of Endangered Resources (ATRI), Jill.Rosenberg@dnr.state.wi.us, 608.266.2499
- Janet Sausen, Wildlife Management GIS Project Leader, BTS/GIS, Janet.Sausen@dnr.state.wi.us, 608.267.2765
- Ann Schachte, GIS Coordinator, Division of Water, Ann.Schachte@dnr.state.wi.us, 608.267.2301
- Jamie Schlangen, Bureau of Endangered Resources (Natural Heritage Inventory Program), Jamelle.Schlangen@dnr.state.wi.us, 608.267.2771
- Andrew Selk, GIS Specialist, Floodplain Mapping Program, Andrew.Selk@dnr.state.wi.us, 608.267.2376
- Jeffrey Walters, Real Estate Specialist, Jeffrey.Walters@dnr.state.wi.us, 608.264.8558

DNR is required by statute to provide an annual Plan to Integrate Land Information to the Wisconsin Department of Administration (DOA). The DNR 2006 Land Information Integration Plan follows the standard format called for by the DOA. An electronic (.pdf-format) version of this Plan can be accessed on the DNR Internet website, at: http://dnr.wi.gov/maps/gis/liip.html.

This Plan was prepared predominantly by staff in the DNR Bureau of Technology Services, Infrastructure & Architecture Section (IAS), and the GIS Services Section, with input from other DNR program GIS data custodians.

New Directions in Land Information-Related Initiatives at the DNR

- **Shift Towards More Cost Recovery in BTS –** Reduction or elimination of some services has taken place since 2004, largely due to budget cuts and workforce reductions at DNR. Additional reductions are anticipated for the FY07-FY09 biennium. Depending on available staff resources, the GIS Services Section and IAS will consider pursuing project work from external agencies and partners outside of DNR.

- **GIS Data Sharing** – DNR/BTS is continues to review its GIS data sharing and data access activities, and to streamline and improve efficiencies in data sharing. BTS continues to investigate and implement new ways to make the DNR's core GIS Data Repository content available to customers, partners and the public via the Internet.

- **Data Development** – DNR/BTS data development-related activities may be reduced. These activities include the acquisition and conversion of digital orthophotography to standardized formats; development of tools to support Global Positioning System (GPS) data collection; and development and maintenance of other core GIS Data Repository data sets.

- **DNR Office of the Information Geographic Information Officer, and the Wisconsin Enterprise GIS (WEGIS) Initiative -** Participation and cooperation with DOA/DET's Office of the Geographic Information Officer (OGIO) providing planning and guidance creating enterprise level geo-spatial support services to all collaborating agencies within Wisconsin State Government has occurred during FY06. These activities have included preliminary planning for enterprise spatial database repository and web mapping services, and planning for DNR's use of enterprise GIS infrastructure as that becomes available during FY07. Future efforts and resource allocations by WDNR with WEGIS initiative activities will be dependent upon FY07 requests from OGIO, availability of WDNR resources, and abiding work plan agreements made between WDOA and WDNR.

- **DOA/DET Shared Information Services Initiative –** The move to consolidate all of the state's information technology resources under the control of DOA's Division of Enterprise Technology (DET) has been initiated with full efforts during FY06. DNR is currently working with DOA/DET to plan for the comprehensive migration of all server-based technology used by DNR programs. DNR is one of the first agencies to proceed with migration plans. Timeframe for migration of the server hardware is occurring between January and August 2006. Implementation impacts of the SIS migration upon DNR GIS and land information related activities will be significant, since the re-installation and testing of GIS applications and data will be required to complete the initiative. Restructuring of DNR GIS infrastructure services is also being modified to allow for effective interaction with DET staff managing DNR's hardware requirements.

- **Forestry GIS –** DNR's Division of Forestry intends to re-engineer their GIS implementations as part of a new Forestry IT Strategic Plan. Upon completion, this Plan will be accessible on the DNR Forestry web pages: http://dnr.wi.gov/org/land/forestry/ .

- **Natural Heritage Inventory (NHI) Portal –** DNR's Endangered Resources Program has developed a password-protected, Internet-based search engine and ArcIMS mapping system that provides real-time NHI data to authenticated internal and external users. The system is designed to simplify the NHI review process and improve consistency of documentation.

- **Real Estate –** DNR's Real Estate Program has implemented a transactional versioned ArcGIS/ArcSDE application. This application allows multiple users to simultaneously edit data within a geodatabase. This framework allows users to create versions of the geodatabase for different project "states", reconcile differences between versions, and update the master version of the geodatabase. The general public can then see all updates in real time mode via an ArcIMS mapping system: http://dnr.wi.gov/org/land/facilities/dnr_lands_mapping.html .

- **State Natural Areas** – DNR's Endangered Resources Program is developing an on-line interface accessible to field managers, researchers, educators, policy makers, and other DNR constituents to access and update data about each SNA. The envisioned product includes a Web and GIS-based management database that will facilitate access to current and historical information. The system will allow property managers the ability to submit management reports on-line and to update site information on a regular basis.

- **Surface Water Integrated Monitoring System (SWIMS) –** SWIMS was initiated in July 2004 to help the state meet its reporting requirements for the federal Storage and Retrieval System (STORET). SWIMS is the state's repository of water and sediment chemistry, field parameters, summary biological data plus sensitive lake designations and other Act 118 designated waters data for waterway and wetlands permits, and aquatic plant management program (APM) data.

- **Waterbody Assessment Display and Reporting System (WADRS) –** WADRS is an integrated assessment database currently under development to support implementation and reporting under the federal Clean Water Act. This database holds Clean Water Act Section 305b and 303d data, designated uses, codified uses, and other data describing the quality of Wisconsin's rivers, lakes, and Great Lakes shoreline.

II. THE FIVE TECHNOLOGY ARCHITECTURES

A. Applications Architecture

A.1. Identify and characterize the major applications which incorporate land information or GIS/LIS.

- **Web Mapping Services Overview**

  Over the past two years, several new DNR web mapping applications have been developed and can be accessed on the agency's intranet and Internet websites (listed below). The demand for web mapping applications continues to grow as GIS and land information technology are increasingly utilized by a broad range of internal and external customers.

  The following DNR web mapping services can be accessed via the "List of GIS Interactive Web Applications" page on the DNR Internet website: http://dnr.wi.gov/maps/gis/applist.html :

  - ***Air Monitoring Network ("WISARDS"):*** http://maps.dnr.state.wi.us/imf/dnrimf.jsp?site=wisards
  - ***DNR-Managed Lands Interactive Web Mapping Tool:*** http://dnr.wi.gov/org/land/facilities/dnr_lands_mapping.html
  - ***Interactive CWD (Chronic Wasting Disease) Status Maps site***: http://maps.dnr.state.wi.us/cwd_imf/
  - ***Natural Heritage Inventory Online Database:*** http://dnr.wi.gov/org/land/er/nhi/NHI_ims/onlinedb.htm
  - ***Surface Water Data Viewer:*** http://maps.dnr.state.wi.us/imf/dnrimf.jsp?site=SurfaceWaterViewer
  - ***DNR Bureau of Remediation & Dedevelopment Sites Map:*** http://dnr.wi.gov/org/aw/rr/gis/

- ***DNR WebView – Online GIS Data Viewer:*** *Includes Digital Orthophoto Tracker, Geodata Download, and Digital Raster Graphics (scanned topographic maps) Download themes:* http://maps.dnr.state.wi.us/dnrwebview/
- ***Wisconsin Waters Initiative - Dam Safety Database, Floodplain Analysis Database & FEMA Map Viewer:*** http://dnr.wi.gov/org/water/wm/dsfm/section/mapindex.htm

➢ **Boat Access Data & Interface**
The Bureau of Facilities and Lands has undertaken development of a statewide boat access GIS layer. In 2006-2006, this GIS layer will be made available to other Department staff (property managers, fish biologists and other additional stakeholders) for quality assurance review. After the data is deemed correct and valid, a public version of the data will be made accessible by means of an internet web mapping application; an internal version of the data will be available for DNR staff on the intranet.

➢ **Chronic Wasting Disease (CWD) Web Mapping Application**
DNR's Bureau of Wildlife Management sponsors the CWD web mapping application, which allows the public and DNR staff to find up-to-date information on the status of the disease in Wisconsin. The application integrates ArcIMS, ArcSDE, and Oracle technologies to help meet a critical public information need.

➢ **Distributed GIS / DNRview Migration** – DNRview is an ArcView3.x-based extension and associated components that help staff throughout the agency use desktop GIS technology to support their program business needs. DNRview has been in use at DNR for over seven years. In 2006-2007, this project will emphasize finalization and deployment of components called "ArcWorks", providing similar core DNRview functionality to users of ArcGIS version 8.x and 9.x software.

➢ **Forestry Airphoto Finder**
Each year the DNR Division of Forestry flies aerial photography that become hardcopy prints stored at the DNR office in Tomahawk. DNR is required by law to recoup the cost for prints requested by the public. To reduce the amount of time spent on these requests, DNR Forestry is developing a web-based GIS tool to easily locate what photo is being requested and to automatically send a request to the vendor so they can make another print from the negatives they house.

➢ **Forest Inventory and Analysis (FIA)**
The USDA Forest Service's Forest Inventory and Analysis (FIA) collects, analyzes, and reports information on the status and trends of America's forests: how much forest exists, where it exists, who owns it, and how it is changing. DNR Forestry developed an FIA Table Maker desktop GIS tool for a limited number of Forestry staff to access the FIA data. The tool will have the ability to incorporate some habitat information, multiple years of sampling, and process multiple requests to synthesize the Forest Inventory Data. For general information about FIA see: http://devel.ncrs.fs.fed.us/4801/. For more information on the FIA specific to Wisconsin, contact Vern Everson (Vern.Everson@dnr.state.wi.us) .

➢ **Forest Visualization**
The Division of Forestry is developing a 3D visualization tool that can be used to demonstrate current forest conditions and the likely visual results of various management scenarios. The inclusion of growth and mortality models can project future grown and forest development into the future. Currently the desktop application is being used for a very focused effort including public involvement, landowner workshops, state forest master planning and a select number of other situations where aesthetics is key in the decision making process.

➢ **GIS Registry of Closed Remediation Sites**
DNR's Bureau of Remediation and Redevelopment (RR) sponsors this project, which provides intranet/Internet access to information about closed sites with groundwater contamination remaining above ch. NR 140 enforcement standards. A goal of this project is to integrate the closed remediation site information with related information in the Bureau of Remediation & Redevelopment Tracking System (BRRTS) Oracle database.

- **Real Estate Program – DNR-Managed Lands Updates**
  DNR's Real Estate (RE) Program has implemented a transactional versioned ArcGIS/ArcSDE application which allows multiple users to simultaneously edit data within a geodatabase. This framework allows users to create versions of the geodatabase for different project "states", reconcile differences between versions, and update the master version of the geodatabase. The general public can then see all updates in real time mode via an ArcIMS mapping system: http://dnr.wi.gov/org/land/facilities/dnr_lands_mapping.html.

- **Surface Water Integration System (SWIS) Embeddable Locator Tool (eLT)**
  The Embeddable Locator Tool (eLT) is a web based locational data editing tool developed as part of the SWIS initiative. This tool has been incorporated into seven applications in the Water Division to provide users with a better method for capturing water-related location information.

- **Source Water Assessment Program (SWAP) Mapping Applications**
  DNR's Bureau of Drinking Water and Ground Water (DG) worked with BTS to develop three internal DNR business applications to support the needs of the Source Water Assessment Program (SWAP):
  1. ***The ArcView VA (Vulnerability Assessment) Tool*** was developed to allow the SWAP staff to digitize potential contaminant sources.
  2. ***The SWAP/VA Form*** automatically creates a map of the site area to enable SWAP staff to complete SWAP Assessments as well as Vulnerability Assessments.
  3. ***The Drinking Water Intranet Mapping Application*** allows SWAP staff to quickly view wells, contaminant sources, and source water areas.

- **Waterbody Assessment Display and Reporting System (WADRS) / Surface Water Integration System (SWIS)**
  WADRS and SWIS are managed by DNR's Water Division. SWIS has several components, including a geographic query interface which, in conjunction with the 1:24,000-scale Hydrography database, enables a set of common queries and analyses to be performed on any water related data sets. SWIS is intended to provide the "framework" for integrating the department's water data, tools for linking program data to the 1:24K Hydrography layer. WADRS is an integrated assessment database currently under development to support implementation and reporting under the federal Clean Water Act. This database holds Clean Water Act Section 305b and 303d data, designated uses, codified uses, and other data describing the quality of Wisconsin's rivers, lakes, and Great Lakes shoreline.

- **Wetlands Digital Data Compilation using an Ortho-Rectified Base**
  DNR's Bureau of Fisheries Management & Habitat Protection (FH) sponsors this project to re-compile wetland information onto digital orthophotography. A goal of this project is to modernize processes and improve data quality to create a statewide seamless digital database.

A.2. Include a discussion of high-level and agency-wide land information integration efforts.

- **Data Management**
  A major ongoing activity of BTS/IAS is to update, manage, and provide access to DNR's GIS Data Repository. This centralized repository contains collections of standardized enterprise geographic framework data that support a wide range of business needs related to: resource management, compliance monitoring and enforcement, permitting, public health and safety; outdoor recreation; wildlife management, Smart Growth and Comprehensive Planning; and U.S. EPA activities. DNR's enterprise geographic data management activities promote data integration and integrity within the agency, and provide DNR staff, partners, and customers with reliable access to core GIS Data Repository contents, in standardized formats. The contents of the GIS Data Repository include framework geographic data, non-spatial tables containing attributes of geographic data, non-spatial reference tables containing standard codes and information used by multiple DNR programs, metadata, supporting documents, and related materials.

The DNR is in the middle of a multi-year transition from agency use of file-based GIS data structures to ArcSDE geodatabases. Although most of the DNR's core GIS data sets reside in ArcSDE and are accessed in ArcSDE by web mapping applications and desktop clients, many staff lacking a reliable network connection continue to rely on file-based GIS data sets (i.e., shapefiles and MrSID files). Prolonged delays in upgrading to current versions of ArcSDE and ArcIMS software have contributed to the delay in DNR transition from file-based to geodatabase structures. Once the upgrade to ArcSDE version 9 occurs, DNR/BTS staff plan to load statewide digital orthophotos into ArcSDE. Initial testing of loading orthos occurred in December, 2005 using a test instance of ArcSDE 9.1.

Improving metadata consistency among various formats (i.e., ArcSDE geodatabases and shapefiles) of the same data sets is an ongoing goal for 2006-2007. In addition, DNR is moving toward use of ArcSDE/Oracle feature classes as the source for several standardized code systems (e.g., water management unit codes, watershed codes) used within the agency. This will eliminate the need to maintain non-spatial codes tables separately from ArcSDE feature classes.

BTS/IAS plans to develop criteria to identify data sets in the GIS Data Repository which are appropriate for retirement or replacement. In some cases, better data may be available from other sources.

- **Data Administration**
  The reliance on ArcSDE by DNR's GIS and Oracle users and applications continues to increase. Data Administration for both non-spatial and geographic (spatial) data requires the development, implementation, and maintenance of core architecture components and related activities. Data Administration goals for 2006-2007 include research, development, and implementation of standards, policies, guidance, and best practices for several newly requested or anticipated ArcSDE and Oracle functions.

- **DNR Land Use Team**
  Several laws give the Wisconsin DNR responsibility and authority to address land use issues. The agency is authorized to directly purchase and manage land for purposes of resource conservation, environmental protection, or recreation. Sections 30.26, 30.27, and 30.275, Wisconsin Statutes give DNR the responsibility to preserve, protect, and enhance urban and wild and scenic rivers. Activities carried out under this chapter have land use implications. DNR's Land Use Team integrates the agency's land use related policy activities, to ensure that all department actions promote and work toward the achievement of sound land use. For more information, see DNR's Community Planning and Land Use Management web pages: http://dnr.wi.gov/org/es/science/landuse/.

A.3. Identify any major GIS/LIS application interfaces developed at the DNR.

This information is provided in Section I.A.1.

A.4. Identify business needs which can benefit from the proposed Wisconsin Enterprise GIS (WEGIS) capabilities. In particular, identify agency business needs for leveraging local governments' investment in Parcel Mapping and Parcel Attributes.

DNR programs have a need for access to up-to-date, statewide framework GIS data in standardized formats and accompanied by data documentation (metadata). These framework GIS data sets include Administrative & Political Boundaries, Digital Orthophotos, Elevation, Land Cover, Land Ownership (parcels), Public Land Interests, Soils, and Transportation. DNR access to these framework data sets in a potential WEGIS data repository would be very helpful in meeting DNR program business needs.

In specific regards to Land Parcel Mapping and Parcel Attribute data, DNR Wildlife Management's (WM) Chronic Wasting Disease (CWD) management involves land managers annually contacting landowners within certain CWD zones for purposes of information sharing and land access. DNR/WM currently acquires the needed land ownership (parcel) data from individual counties, and integrates the varying county standards into one multi-county layer to meet this need. County restrictions on the use of these data limit DNR's use of the data, and prohibit the DNR from re-distributing the parcel data outside of the DNR.

B. Information Architecture

B.1a Identify the major land information data sets, and the corresponding metadata, developed, enhanced, or currently used within your agency. Particularly, identify any land information for which your agency has assumed custodianship.

An ongoing task of BTS/IAS is to develop and maintain metadata for the contents of the DNR GIS Data Repository. As metadata becomes available, it accompanies requested data sets. Examples of these metadata are also accessible on the DNR internet site: http://dnr.wi.gov/maps/gis/metadata.html.

In some cases, metadata describing DNR program GIS data is also available on web pages maintained by the custodial DNR program elsewhere on DNR's website. The following is a description of land information for which DNR has custodial responsibilities:

Dams
The DNR Bureau of Watershed Management (WT) is the custodian for the state's dam inventory, which is maintained in a relational database. Dam inventory data are available from the bureau custodian; for more information contact:
Meg Galloway, WT/2; Meg.Galloway@dnr.state.wi.us, 608.266.7014.

DNR-Managed Lands
The DNR Bureau of Facilities and Lands (LF) is the custodian for DNR-Managed Lands data. For more information, contact:
Jeffrey Walters, LF/4; Jeffrey.Walters@dnr.state.wi.us, 608.264.8558.

Fire Zone/Structure
The DNR Division of Forestry (FR) is currently constructing GIS information layers to be applied for wildfire protection. For further information, contact:
Janel Pike, FR/4; Janel.Pike@dnr.state.wi.us, 608.266.2050.

Forest Tax
The Managed Forest Law and Forest Crop Law are private land ownership enrollments participating in a tax referral program. For further information, contact:
Janel Pike, FR/4; Janel.Pike@dnr.state.wi.us, 608.266.2050.

Forest RECON/Timber Sales - Forest Stands
The DNR Division of Forestry (FR) is the custodian for the State Forest Stand Map geographic data layer, with coverage available for Wisconsin's six major state forests. For further information, contact:
Janel Pike, FR/4; Janel.Pike@dnr.state.wi.us, 608.266.2050.

Floodplain Zoning
The DNR Bureau of Watershed Management (WT) is the custodian for the state's Floodplain Zoning data. For more information about floodplain and shoreland zoning data at DNR, contact:
Andrew Selk, WT/2, Andrew.Selk@dnr.state.wi.us, 608.267.2376.

Hydrography at 1:24,000 Scale
A statewide 1:24,000-scale Hydrography GIS data layer was completed in 2001 as the result of a cooperative project initiated by DNR. Version 3 of the 24K Hydrography layer was completed in 2003. Contact information and user documentation for this data layer is posted on the DNR website: www.dnr.state.wi.us/maps/gis/datahydro.html . For more information, contact:

Ann Schachte, WT/2; Ann.Schachte@dnr.state.wi.us, 608.267.2301.

Landnet
BTS is the custodian for the Landnet geographic data layer, which is a representation of the Public Land Survey System (PLSS), automated primarily from sources compiled at 1:24,000 scale. Technical documentation for the 1:24K Landnet data set can be downloaded from the following DNR web page: http://dnr.wi.gov/maps/gis/datacd.html . For additional information, contact:

John Laedlein, ET/8; John.Laedlein@dnr.state.wi.us, 608.264.8914.

National Hierarchical Framework of Ecological Units (NHFEU)
The NHFEU is an ecological classification system that divides landscapes into ecologically significant regions at multiple scales. For more information, contact:

Janel Pike, FR/4; Janel.Pike@dnr.state.wi.us, 608.266.2050.

Natural Heritage Inventory
The DNR Bureau of Endangered Resources (ER) Program plays a critical role in the development and maintenance of data on Wisconsin's rare resources. ER's Natural Heritage Inventory (NHI) program leads the Bureau's efforts to collect, store and interpret these data. For more information about Natural Heritage Inventory data, contact:

Julie Bleser, ER/4; Julie.Bleser@dnr.state.wi.us, 608.266.7308

Recreational Trails
The DNR Bureau of Parks and Recreation (PR) is the custodian for the Recreational Trails GIS data set. For information about DNR trails-related tabular data that may be integrated with the Recreational Trails GIS data set, contact:

Brigit Brown, PR/6; Brigit.Brown@dnr.state.wi.us, 608.266.2183.

State Natural Areas
The DNR Bureau of Endangered Resources' State Natural Areas Program tracks and maintains a wide assortment of Natural Areas' data including management history, information on plant and animal species, rigorous baseline data, site inspection information, research and educational project data, acquisition information, and GIS project and site boundaries. For more information about State Natural Area data, contact:

Dawn Hinebaugh, ER/6; Dawn.Hinebaugh@dnr.state.wi.us, 608.266.5243

Wildlife Management
The DNR Bureau of Wildlife Management (WM) is the custodian for several statewide data layers: Deer Management Units (DMUs), Bear Management Zones (BMZs), Turkey Management Zones (TMZs), and management units related to Chronic Wasting Disease (CWD). In addition, DNR/WM also collects and maintains the statewide sampling results for CWD Deer Sampling data. For more information, contact:

Janet.Sausen, ET/8; Janet.Sausen@dnr.state.wi.us, 608.267.2765.

Watersheds
The DNR Statewide Watershed Boundary Geographic Data Layer was developed cooperatively by the DNR Bureau of Watershed Management and the GIS Services Section. The data custodian is the DNR Bureau of Watershed Management (WT). For more information about this data set, contact:

Jeff Kreider, WT/2; Jeff.Kreider@dnr.state.wi.us, 608.266.0856.

WISCLAND Land Cover
The WISCLAND Land Cover data layer was the result of a 5-year work effort to interpret the state's land cover (primarily vegetation) from 1992-1993 satellite images. The WISCLAND data and documentation can be accessed on the BTS web pages: http://dnr.wi.gov/maps/gis/datalandcover.html . For more information, contact:

John Laedlein, ET/8; John.Laedlein@dnr.state.wi.us, 608.264.8914.

Wisconsin Wetland Inventory
The DNR Bureau of Fisheries Management and Habitat Protection (FH) is the custodian and sole distributor for the Digital Wisconsin Wetland Inventory (WWI) geographic data layer. FH is implementing a process using Orthomapper software to create digital orthophotos from the interpreted aerial photos, using existing digital orthophotography for control. For information about the distribution policy, license agreement, and data sharing fee structure for WWI data, contact:

Calvin Lawrence, FH/4; Calvin.Lawrence@dnr.state.wi.us, 608.266.0756.

Other Geographic Data Managed by the DNR Water Division
In addition to the major data sets described above, the DNR Water Division has custodial responsibilities for several other water-related data. For information about potential points of contact for these data layers, refer to the DNR Water Division web pages: http://dnr.wi.gov/environmentprotect/water.html

- Contaminant Source Inventory (sources located inside delineated protection areas around public wells ONLY!)
- Designated Use Classifications
- Eurasion Water Milfoil sites
- Fish Contaminant/ Advisory sites
- Impaired waters (303d)
- Landspreading sites
- Outstanding and Exceptional Resource Waters (NR102)
- Sediment Contamination sites
- Subwatersheds (statewide, patchwork created for Non-Point Priority watershed project areas)
- Variance Waters (NR104)
- Waste Water Outfalls
- Water Quality Monitoring stations
- Waterway and Wetland Permits (Chapter 30)
- Wells – Private, public, and monitoring wells
- Zebra Mussel infestation sites

B.1b. Identify mechanisms of access or distribution of land information and metadata, e.g., via the Internet, WISCLINC, standard or custom CD-ROM products, FTP (file transfer protocol), zip file, etc.

- Metadata accessible on the DNR website: http://dnr.wi.gov/maps/gis/metadata.html
- Standard data sharing CDs: http://dnr.wi.gov/maps/gis/datacd.html

- FTP (file transfer protocol) the ftp addresses to use to download GIS data from the DNR external ftp site is provided in the Data Distribution Section of the metadata files: http://dnr.wi.gov/maps/gis/metadata.html. The direct address for the external ftp site used for GIS data sharing is: ftp://gomapout.dnr.state.wi.us/geodata/ . Expanded use of ftp to provide access to DNR GIS data is possible in the future, depending on available resources.
- Internet Map Service-based data download: This is currently being provided through the Geodata Download theme in DNR WebView – Online GIS Data Viewer: http://maps.dnr.state.wi.us/dnrwebview/
- BTS has provided copies of geospatial metadata to WISCLINC in the past, and will do so in the future as requested.

B.1c. Identify all major land information or metadata, if any, that your agency makes available through your agency web site(s), and any land information data or metadata your agency plans to make available later either through your agency web site(s) or through WISCLINC. Include a discussion of that land information necessary for local comprehensive planning under Wisconsin ss. 66.1001(2).

BTS currently provides access to a variety of agency land information data through FTP, CD/DVD, the BTS web pages (http://dnr.wi.gov/maps/gis/), and through web mapping services such as DNR WebView (see Section II.A.1).

B.1d. Identify any policies, content or technical standards your agency utilizes for the collection and use of land information or metadata.

The DNR's "Locational Data Standards" are posted on the DNR internet site: http://dnr.wi.gov/maps/gis/location.html

DNR also maintains the following documents for internal use: "ArcSDE User Guide" and "ArcSDE Database Objects: Naming and Structure Conventions".

Other documents intended to help DNR programs collect locational data using Global Positioning Systems (GPS) technology can also be accessed on the BTS web pages (http://dnr.wi.gov/maps/gis/). Individual DNR programs may develop their own procedures for data collection and use to meet their business needs.

DNR's de facto standard for geographic metadata is the "Content Standards for Digital Geospatial Metadata" (CSDGM) of the U.S. Federal Geographic Data Committee; http://www.fgdc.gov/metadata/contstan.html. In cases where CSDGM metadata are not available from DNR custodial programs, available informal documentation accompanies requested data.

B.1e. Identify major land information that may relate to or depend upon other State Agency land information (from yours or another agency) for technical integration.

BTS frequently shares requested land information with federal, state, and county or regional government agencies for purposes of technical integration. Commonly requested DNR land information include those data cited in Section II.B.1c.

Individual DNR programs may have technical relationships with other government agencies which involve integration of land information to meet programs' business needs. Information about these relationships can be obtained by contacting the responsible DNR program directly (for contact information, refer to the listing of DNR custodial data in Section II.B.1a, or to the DNR Internet site: http://dnr.wi.gov).

A major example involves the DNR Bureau of Drinking Water and Groundwater, which is the agency's lead program for Wisconsin's Source Water Assessment Program (SWAP). The overall goal of SWAP is to gather and utilize meaningful information to assist source water protection efforts and the overall drinking water program in the state. Existing information from numerous state and federal programs (i.e., locations of significant potential sources of contamination) are integrated with SWAP-collected data to produce information about public water susceptibility to contamination. For more information, contact:

Jeff Helmuth, Source Water Protection Team Leader, Bureau of Drinking Water and Groundwater, DG/2
Jeffrey.Helmuth@dnr.state.wi.us, 608.266.5234.

B.1f. Identify and describe land information from outside sources, for which the agency has a need and requires access to carry out day-to-day responsibilities, functions and statutory requirements. Identify any barriers or obstacles to accessing such data. This may include federal, state, regional, local, tribal or municipal data. Include a discussion of the agency's intended use and application for such data.

BTS seeks to obtain land information from sources outside DNR needed to help agency programs meet their business requirements. BTS plays a key role in converting externally produced land information to standardized formats that facilitate integration with DNR program data.

An ongoing obstacle is a lack of funding to acquire the data from producing agencies which view the sale of land information as a revenue source. BTS's ability to obtain these data from federal agencies, state agencies, regional planning commissions, tribal governments, and local units of government depends on data sharing or other inter-agency cooperative relationships. In many cases, BTS has been successful in building inter-agency data sharing relationships as a means of obtaining needed data so that it can be made available throughout the DNR and to partners and other customers. Information exchanges also take place between other DNR programs and local governments. Examples of land information needed by DNR and produced by outside sources include:

- **Digital Orthophotos (DOPs)**
- **Elevation**
- **Land Parcels**
- **Soils**
- **Census Data**
- **Transportation Data**
- **Address Data / Centralized address geo-coding services**
- **Minor Civil Divisions (dynamically updated to reflect incorporations, etc.)**

At this time, the future level of resources available to BTS to support spatial data acquisition, conversion and management on behalf of the DNR, its partners and customers, is unknown.

B.2. Identify the software used to develop and provide access to geospatial metadata (e.g., ArcCatalog, Spatial Metadata Management Software (SMMS), U.S. Geological Survey-developed tools,…). State whether the software generates metadata consistent with the FGDC Content Standard for Digital Geospatial Metadata, adopted by WLIP.

Software used to develop and provide access to geospatial metadata varies within DNR, but include: ArcCatalog; Microsoft Word, Notepad, and the metadata editor ("tkme") and metadata parser ("mp") developed by Peter Schweitzer of the US Geological Survey. An ORACLE-based metadata entry system for a subset of the FGDC metadata standard was developed for the Aquatic and Terrestrial Resources Inventory (ATRI) project. SMMS software has been used by some DNR staff. BTS encourages DNR programs to develop, maintain and provide access to geospatial metadata in a consistent form (i.e., CGDSM-compliant) regardless of the tools used.

B.3. For any metadata or land information on the agency's web site(s), please provide the title, Internet URL's, which include the CSDGM abstract, and the purpose. For metadata not accessible via the agency's web site(s) or Internet, please provide a list of all major metadata and the access method that is or would be applied for outside-agency use.

Metadata for much of the DNR GIS Repository data can be accessed on the DNR internet site: http://dnr.wi.gov/maps/gis/metadata.html .

In many cases, metadata describing DNR program geospatial data is available elsewhere on the DNR website, on web pages maintained by the custodial DNR program. A large quantity of DNR metadata has also been entered into the Aquatic and Terrestrial Resources Inventory (ATRI), available through the ATRI Metadata Explorer at: http://atriweb.info/Metadata/ . Refer to Section II.A.1.d for ATRI contact information.

B.4. Identify the agency's plans for future metadata collection and maintenance.

BTS will continue to promote metadata collection and consistency. BTS seeks to standardize use of ArcCatalog for metadata authoring, update, management and access. BTS also intends to use ArcIMS Metadata Services to provide broader access to agency geospatial metadata in the future.

The Aquatic and Terrestrial Resources Inventory (ATRI) will continue to work with data custodians to create and collect metadata for natural resources related information. These metadata are inventoried and updated through the ATRI Metadata Explorer.

C. Technology Architecture

Address the agency's approach to GIS technology implementation and include a discussion of the agency's vision of future technology architecture, software purchases and upgrades. Include a discussion of Enterprise-standard GIS/LIS workstation/desktop software, and related software.

DNR's GIS technology architecture provides the foundation that supports land information development and use throughout the agency. The Department's vision of technology architecture for GIS implementation provides for:

- Multi-tier levels of functionality and capability appropriate for staff needs.
- More web-based and distributed architecture.
- User-authentication capability, to grant levels of use and access permissions.
- Expanded ability to access geographic data and functions with a variety of interfaces, including GIS clients, web browsers and other lightweight clients.
- Acceptable performance serving large GIS data sets and digital map data to the standard desktop.
- Enterprise database serving and management to enable staff access to current data from remote locations.
- Adequate performance when linking GIS data with Oracle data tables from the standard desktop.
- Improved data management options which implement effective transactional update for geographic and related data.

DNR Strategic Planning for Technology Services Infrastructure & Architecture
The move to consolidate all of the state's IT resources under the control of DOA's Division of Enterprise Technology (DET) will alter the DNR's architecture significantly over the next 18 months, effectively resulting in the outsourcing of the networking and server components of the agency's architecture to a service provider. This change will require the agency to comply with policies and procedures set for the state enterprise by DET, as well as relinquish considerable control over its capacity to change the architecture to meet its business needs.

In this context, the role of the BTS Infrastructure & Architecture Section (I&A) will become increasingly important as the agency moves from individual technology solutions to "architected" solutions designed to be stable and improve the technology infrastructure of the state enterprise This will require I&A - in conjunction with the other sections of BTS and DNR programs - to provide leadership in defining technology directions and standards for the agency that will enable the DNR to maximize the capacity of IT to satisfy its business needs within the restrictions imposed by reliance on a state enterprise architecture. This will be accomplished based on strategic initiatives already started that include realignment of staff and other resources, and in close cooperation with and integration of the architecture standards defined by DET. Likewise, within these standards, I&A will have to work with DET to achieve implementation of any changes in the enterprise architecture needed to meet its IT requirements.

Within BTS, I&A have to align itself closely with the Systems Development Framework of the Systems Services Section and with the Technical Services section in its new roles and responsibilities. It also will have to integrate the GIS activities of the agency and enterprise GIS resources into DNR's architecture and support processes.

Standard GIS/LIS workstation/desktop software.

The agency has migrated the desktop operating system from Windows NT to Windows XP.

Professional desktop GIS software consist of the ESRI products ArcInfo and ArcView. ArcInfo users have upgraded to ArcGIS 9. ArcView users will continue to use ArcView 3.x, and many will upgrade to ArcGIS 9 over time. We have completed the migration of end-user GIS software from the Windows NT operating system to Windows XP.

GIS Server Software

1. ***ArcSDE*** - ESRI Spatial Database Engine (ArcSDE) is DNR's enterprise geographic data service. DNR currently runs SDE on top of the Oracle 9i database on Unix servers. Separate "development" and "production" SDE/Oracle database instances are maintained. DNR has experienced prolonged delays in upgrading to ArcSDE version 9, but intends to do so as soon as possible.
2. ***ArcIMS*** - ESRI ArcIMS Internet map serving software is used for new web mapping application development. ArcIMS utilizes SDE for geographic vector data serving. ArcIMS clients have been the standard desktop web browser. We plan to research the utility of using the standard desktop GIS software as clients to the ArcIMS server. DNR has experienced prolonged delays in upgrading to ArcIMS version 9, but intends to do so as soon as possible.
3. ***ArcGIS Server*** - ESRI ArcGIS Server is a GIS enterprise application server that provides GIS capabilities throughout an organization while maintaining centralized data management and application support. This is a new product that DNR began implementing in 2005.

Address geocoding software

Centrus address geocoding software is used for address geocoding and address certification.

Image processing/remote sensing tools

Some limited use of ERDAS Imagine software is applied to remote sensing image interpretation and conversion. OrthoMapper software (a product of Image Processing Software, Inc.) is used for soft-copy photogrammetry by GIS

Services staff and the Wetlands interpretation program. Multi-Resolution Seamless Image Database (MrSID) image software is used for scanned airphoto mosaicing, compression, and serving.

GPS (global positioning systems) tools
BTS continues to promote the effective use and integration of field data collection, global positioning systems (GPS) and other devices into the technology infrastructure. Trimble Pathfinder GPS desktop software is used for post-processing and analysis. Basic information about GPS tools and technology can be accessed on the BTS GPS web page: http://dnr.wi.gov/maps/gis/gps.html . BTS has developed additional tools such as the DNR Garmin GPS Tool, which allow DNR staff to upload and download GPS data in WTM coordinates. BTS's ability to continue to support development and use of GPS tools is unknown at this time.

Large-format plotting/other output capabilities tools
Hewlett-Packard large format roll-feed plotters and various color laser printers are in use.

Metadata-collection tools
This information is provided in Section B.1f.2 .

D. Organizational Architecture

D.1 Identify the Agency's plans for GIS/LIS training and include a discussion of any specific GIS/LIS-related training activities you wish to see offered for State employees.

GIS training-related issues and trends at DNR include:

- A need for more affordable GIS training
- A need for GIS instructors from Environmental Systems Research Institute (ESRI)
- Use of Wisconsin DNR land information as part of the training
- Requests from DNR staff for GIS training that is customized to meet their specific business needs
- Staff who do receive training often do not have an opportunity to use it in a timely manner to retain skills learned
- Staff are making increasing use of on-line or computer-based training

Other prospects for GIS training for DNR staff are unknown at this time.

D.2 Describe any formal or informal land information sharing or development agreements your agency currently supports or is a party to (e.g., Memoranda of Understanding/Agreement, other cooperative agreements, consortia agreements, etc.). Include a description of potential partners and mutual projects of this nature, which your agency either plans to pursue or would be interested in pursuing.

Formal Data Sharing Agreements & Consortia:

- Memorandum of Agreement between DNR, the Wisconsin Department of Transportation, and Wisconsin Power and Light: "Natural Resource Regulatory Permitting & Information"
- 1999 Memorandum of Agreement between DNR and the Department of Administration "to ensure optimal accuracy of Geographic Information Systems (GIS) data between the agencies and to develop procedures for resolving errors in data".
- Agreements between DNR and various Counties in which DNR acknowledges restrictions that the Counties have placed upon their digital orthophotography or other data products.
- WISCLAND (the Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data, a

partnership of public and private organizations seeking to facilitate landscape GIS data development and analysis). Although the WISCLAND consortium has been largely inactive since completion of the statewide Land Cover data set several years ago, WISCLAND remains a potential mechanism for cooperative inter-agency GIS/LIS data development or improvement.

- In 2005, the DNR became participant in the WisconsinView consortium: http://www.wisconsinview.org/ . WisconsinView is one of several "StateView" members of AmericaView, a nationwide program that focuses on remote sensing and related geospatial technologies in support of applied research, K-16 education, workforce development, and technology transfer. The future of the WisconsinView program is currently in doubt due to cuts in federal spending for AmericaView.

Cooperative & Collaborative Arrangements:

The DNR BTS and GIS Services Sections maintain informal data sharing arrangements with:

- Federal Agencies: These include the USGS, USDA/NRCS, US EPA, US Park Service, and the USFWS.
- State Agencies: These include the Wisconsin Departments of: Administration; Agriculture, Trade and Consumer Protection; Emergency Management; Health and Family Services; Public Service Commission; Transportation.
- Departments & Programs of the University of Wisconsin System: These include the UW-Madison Department of Forestry; UW Land Information and Computer Graphics Facility; UW Environmental Remote Sensing Center (ERSC); UW-Milwaukee American Geographical Society Collection; Wisconsin Geological & Natural History Survey
- Wisconsin Regional Planning Commissions
- The Wisconsin State Cartographer's Office

DNR is an active participant in interagency and intergovernmental data sharing and standards development efforts. Groups in which DNR participates and intends to continue to pursue GIS/LIS integration and cooperation include:

- Wisconsin Land Information Program: DNR is an active participant in the activities of the Wisconsin Land Council, Wisconsin Land Information Board, and the Wisconsin Land Information Association (WLIA).
- WLIA Workgroups: DNR actively participates in the Digital Elevation Task Force and Wisconsin County Coordinate Systems Task Force of WLIA.
- WISCLAND: DNR was a co-founder, active participant, and supporter of WISCLAND (the Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data), a partnership of public and private organizations seeking to facilitate landscape GIS data development and analysis. WISCLAND is currently inactive.
- USGS/FGDC: Potential participant in standards and framework data development for metadata and transportation data models, and geodetic, cadastral, and transportation framework data for the National Spatial Data Infrastructure (NSDI).

DNR's Division of Forestry participates in a Wisconsin partnership that developed the Landtype Association (LTA) layer of the National Hierarchical Framework of Ecological Units (NHFEU) for the entire state.

The Bureau of Endangered Resources currently contracts for specific ATRI system development with the University of Wisconsin Herbarium as part of the collaborative project.

Given the Natural Heritage Inventory exemption from the Wisconsin Open Records Law, the program is only able to share specific locational information through data sharing agreements, such as Cooperative Agreements and License Agreements. The Heritage Program currently averages 20-30 active agreements with various state, local, and federal government agencies as well as limited agreements with several state utility companies.

Interagency workshops are conducted regularly for planners from local units of government, consulting firms and citizen planners to impart information on data and resources important for completion of comprehensive plans from

each respective agency. Participating agencies include: DNR, DATCP, DOT, DOR, PSC, WNHS, UW-LICGF. The list of participating agencies continues to grow.

DNR Land Use Program staff are conducting workshops to evaluate web based tools for assessing the impacts of land use decisions on the environment. After the evaluation of the tools is complete, staff will conduct workshops for citizen planners and others in order to support their need for using the tools to develop logical discussion relative to local land use decisions.

D.3 Identify any internal agency GIS/LIS-related groups.

- DNR/BTS staff participate periodic DNR GIS Informational Meetings in cooperation with other DNR programs active in GIS/LIS. These meetings currently occur once per month.
- DNR Regional GIS User Groups meet periodically.
- The DNR Land Use Team provides access to land use-related publications and other information about DNR activities with land use implications: http://dnr.wi.gov/org/es/science/landuse/plan/pubs.htm .

D.4 Identify any other organizational needs you anticipate.

- There is an ongoing need to align GIS/LIS and Information Technology budgets with agency business requirements; the information provided in the Land Information Plans should be used to re-prioritize land information funds to accomplish this alignment across State Agencies.

E. Security Architecture

E.1 Provide any policy or statutory provisions related to privacy, cost recovery, liability, legal disclaimers, copyright or licensing related of land information, mapping, data distribution, usage, and the Internet. Address any open records laws issues that relate to the data distribution needs of the agency.

- DNR has reviewed and enhanced its overall IT security model, including security components related to its Oracle databases (including SDE) and application development and deployment procedures. As DNR develops more Internet-based applications, including those that allow external update of internal databases, its security model must take additional steps to protect data from unauthorized access and use.

- As technology security services become consolidated as part of DOA's Shared Information Services (SIS) initiative, issues of security architecture will generally be addressed at DOA, or by DOA directive to the DNR.

- A 2004 DOA Draft Information Classification Standard established security categories for Wisconsin information assets and information systems. This standard is adapted from the 'Standards for Security Categorization of Federal Information and Information Systems' (FIPS PUB 199) published by the National Institute of Standards and Technology (NIST) in December 2003.

- The draft standard identified the need for Wisconsin state agencies to review and classify the confidentiality, integrity and access requirements for data and applications. Security categories assigned to information assets and information systems are to be used in conjunction with risk assessment information to ensure the implementation of appropriate security controls to protect those assets. If implemented, this standard would be a major component of a future architecture that would apply to GIS and other IT functions at the DNR.

- DNR is addressing “Homeland Security” concerns as new data sets and applications are built or existing ones are enhanced.

- DNR complies with the Open Records Law when handling requests for data and applications, including those involving land information. Depending on the context, DNR uses various disclaimers to notify users of appropriate uses of and support for requested data and applications. The legislature has granted Open Records Law exemptions to certain DNR that manage environmentally sensitive information, such as the Natural Heritage Inventory of rare and endangered species, and the Wisconsin Wetlands Inventory. Under these exemptions, the custodial program may be allowed to restrict access to certain information, or to charge fees.

- DNR adheres to all legal and other requirements for computer matching of personally identifiable information; Act 88 “opt out” related to facility contacts, recreational licenses, park vehicle admissions, and boat, ATV, and snowmobile registrations; and other applicable state and federal laws and rules designed to protect the privacy of individuals and the habitats of endangered species.

- DNR employs standard database administration practices, through the use of virus-checking software, password-protected logins, and establishment of an Internet firewall, to establish secure systems as appropriate. For other security architecture solutions, particularly related to secure Internet data access and user authentication, the agency is awaiting WAMS (Web Access Management System) recommendations.

- DNR/BTS includes a statement of legal information with all BTS distributions of DNR geographic data to requesters outside of the agency. The legal information statement was downloaded from the following DNR Website Legal Information web page: http://dnr.wi.gov/org/legal/WebSiteLegalInformation.html .